

REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering the present application.

I. Disposition of Claims

Claims 1-28 are currently pending in the present application. By way of this reply, claims 1, 8, 15, and 22 have been amended.

II. Claim Amendments

Independent claims 1, 8, 15, and 22 have been amended to clarify that the bump referred to in these claims is mounted on a landing pad portion of a metal layer. Further, independent claims 1, 8, 15, and 22 have been amended to clarify that the vias in the various regions referred to in these claims are laterally peripheral to the landing pad portion. No new matter has been added by way of these amendments as support for these amendments may be found, for example, in paragraph [0026] and Figure 5a of the present application.

III. Objection(s) to the Drawings

The drawings were objected to as failing to comply with 37 CFR § 1.84(p)(5) for including reference signs that were not mentioned in the Detailed Description section of the present application. Specifically, Figure 4c was objected to as including reference signs **53a**, **53b**, **53c**, and **53d** that were not mentioned in the Detailed Description section

of the present application as filed.

By way of this reply, paragraphs [0026] and [0028] of the present application have been amended to correct a typographical error by replacing instances of **55a**, **55b**, **55c**, and **55d** referring to Figure 4c with **53a**, **53b**, **53c**, and **53d**, respectively. Thus, the reference signs **53a**, **53b**, **53c**, and **53d** in Figure 4c are now mentioned in the Detailed Description section of the present application. Accordingly, withdrawal of the objection to the drawings is respectfully requested.

IV. Rejection(s) Under 35 U.S.C § 102

U.S. Patent No. 5,736,791

Claims 1-22 of the present application were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,736,791 issued to Fujiki et al. (hereinafter "Fujiki"). For the reasons set forth below, this rejection is respectfully traversed.

The present invention is directed to an integrated structure in which vias are selectively positioned around a bump so as to increase the uniformity of current distribution around the bump, thereby reducing current crowding at the bump. *See* Specification, paragraph [0024]. With reference to the exemplary embodiment of the present invention shown in Figure 5a of the present application, vias **50a**, **50b** are more heavily concentrated along outer regions **57a**, **57b** of the metal layer **M8** than in a region **57c** between the outer regions **57a**, **57b**. *See* Specification, paragraph [0028]. As explained in paragraph [0028] of the present application, such an arrangement of vias leads to increased current distribution uniformity and reduced current crowding at the bump. Further, amended independent claims 1, 8, 15, and 22 of the present application

require that vias in at least one of the various regions of vias on the metal layer be *laterally peripheral* to a landing pad portion of the metal layer to which the bump is mounted.

Fujiki, in contrast, fails to disclose, or otherwise teach, such an arrangement. In Fujiki, vias are selectively positioned in an interlayer insulation layer disposed between two metal layers so as to prevent cracks that would otherwise form in the interlayer insulation layer during bonding of a bump to a landing pad portion of the top metal layer. See Fujiki, Abstract; column 3, lines 44 – 52; column 4, lines 18 – 24; Figure 3. As shown in Figures 3 and 7 of Fujiki, in order to prevent cracking in the interlayer insulation layer 4, (1) a first metal layer 3 is designed such that it is hollow or slotted so as to result in there being no metal layer under the bonding region and (2) via holes 5 are positioned in “four corner portions of the bonding pad 20” on the first metal layer 3. See Fujiki, column 10, lines 45 – 52. Accordingly, as stated in Fujiki:

Therefore, when the pattern of the via holes (5) is located outside the circle D and the first Al wiring layer (3) is formed only beneath the via holes (5), *under the bonding region*, no first Al wiring layer (3) is present beneath the second interlayer insulation layer (4). That is, the second interlayer insulation layer (4) is not sandwiched by the Al wiring layers, and thus no crack occurs in the interlayer insulation layer

Fujiki, column 11, lines 1 – 8 (emphasis added).

Thus, Fujiki, which is concerned with the prevention of crack formation and the positioning of vias *under* the bonding region (landing pad), fails to consider, and thereby fails to disclose, the positioning of vias *laterally peripheral* to a landing pad portion to which a bump is mounted in an arrangement that leads to a reduction in current crowding at the bump as required by amended independent claims 1, 8, 15, and 22 of the present

application.

In view of the above, Fujiki fails to show or suggest the present invention as recited in amended independent claims 1, 8, 15, and 22 of the present application. Thus, amended independent claims 1, 8, 15, and 22 of the present application are patentable over Fujiki. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

U.S. Patent No. 5,404,047

Claims 22-28 of the present application were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,404,047 issued to Rostoker et al. (hereinafter "Rostoker"). For the reasons set forth below, this rejection is respectfully traversed.

Like Fujiki, Rostoker fails to disclose all the limitations of amended independent claim 22 of the present application. Rostoker, which is directed to a technique for increasing the number of bond pads on an integrated circuit by shaping the bond pads to conform with the shapes of the bond pad contacts (*e.g.*, bumps) (*see* Rostoker, Abstract; column 4, lines 31 – 35), is altogether silent as to the positioning of vias *laterally peripheral* to a bond pad portion of a metal layer, where a varying concentration of vias on the metal layer results in increased current distribution uniformity around the bump. Further, as clearly apparent from Figures 9b and 10 of Rostoker, the positioning of vias **916, 1010, 1012** in Rostoker does not result in increased current distribution uniformity around the bump **920, 1020**. Thus, Rostoker fails to disclose an integrated circuit structure in which vias are positioned laterally peripheral to a landing pad portion of a metal layer to which a bump is mounted in an arrangement that increases current

distribution uniformity as recited in amended independent claims 1, 8, 15, and 22 of the present application.

In view of the above, Rostoker fails to show or suggest the present invention as recited in amended independent claim 22 of the present application. Thus, amended independent claim 22 of the present application is patentable over Rostoker. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

V. Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 03226.156001;P6864).

Respectfully submitted,

Date: 4/25/03



Jonathan P. Osha, Reg. No. 33,986
ROSENTHAL & OSHA L.L.P.
1221 McKinney Street, Suite 2800
Houston, TX 77010

Telephone: (713) 228-8600
Facsimile: (713) 228-8778